

Calibrating MIPS SED Mode using Planetary Nebula

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ABSTRACT

The Multi-band Imaging Photometer for SIRTF (MIPS) is one of the three instruments to fly next year in the Space Infrared Telescope Facility (SIRTF). MIPS will be used mainly as a photometer, nevertheless, it has an integrated slit and grating that permits to use it as a low resolution ($R=20$) spectrometer and be able to observe the Spectral Energy Distribution (SED) of a given source over a wavelength range of $52\text{-}99\mu\text{m}$.

In this work we show how Planetary Nebulae can be used to calibrate in wavelength this low resolution spectrometer.

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The SED optics consist of a concave grating spectrograph, composed of an entrance slit (slit mirror in this case) spherical mirror, a normally ruled diffraction grating and a 2D imaging array (MIPS 70 μm focal plane (FPA)). Both “legs”, i.e. distance from grating to slit and grating to FPA, are nominally equal, maintaining a 1:1 image size ratio. The grating is worked in the outside first order. Since the SED mode optics are similar to those for the wide field at 70 μm , their imagining properties will be roughly similar.

The SED mode will be calibrated in wavelength using Planetary Nebulae and HII regions. In this work we show how real sources, extracted from the Infrared Satellite Observatory (ISO), are expected to be detected by MIPS SED mode. The sample of objects, all of them PNs, come from observations taken by the Long Wavelength Spectrometer (LWS) that covered a wavelength range of 45-200 μm with a spectral resolution 10 times higher ($R \sim 200$).

The Planetary Nebula are in general high excitation objects, for which [O III] 51.8145 μm , [O III] 88.3560 μm and [N III] 57.317 μm , among others, are very strong and remained visible despite the low spectral resolution of the SED mode.

The Planetary Nebulae ISO LWS data have been processed using ISAP; the spectra were rebinned to a spectral resolution of $R=20$ in all cases.

REFERENCES

Rieke, G.H. 2000 MIPS System Description Document

Table 1. Planetary Nebulae useful for MIPS SED Mode

Object	RA(2000)	DEC(2000)	Visibility(from)	Visibility(to)	No. Days
NGC3132	10h07m01.76s	-40d26m11.1s	2002 Dec05	2002 Feb 04	60.9 days
NGC6153	16h31m31.80s	-40d15m14.5s	2002 Aug03	2002 Sep 16	42.1 days
NGC6302	17h13m44.20s	-37d06m14.0s	2002 Aug12	2002 Sep 25	41.3 days
NGC6720	18h53m35.16s	+33d01m43.2s	2002 Aug13	2002 Nov 04	83.3 days
NGC6781	19h18m28.50s	+06d32m18.0s	2002 Sep12	2002 Oct 30	48.1 days
NGC6826	19h44m48.15m	+50d31m30.3s	2002 Jul16	2002 Dec 18	155.7 days
			2003 Apr20	2003 Dec 25	248.4 days
			2004 Apr27	2005 Jan 01	248.9 days
NGC7027	21h07m01.7s	+42d14m10.0s	2002 Jul16	2002 Aug 01	16.6 days
			2002 Oct07	2002 Dec 23	77.0 days

Figure Captions

Fig. 1.— Sketch of the MIPS optics

Fig. 2.— A diagram of the MIPS instrument showing the distribution of the main optical components and arrays.

Fig. 3.— SED response to a continuum source

Fig. 4.— NGC3132 DSS image.

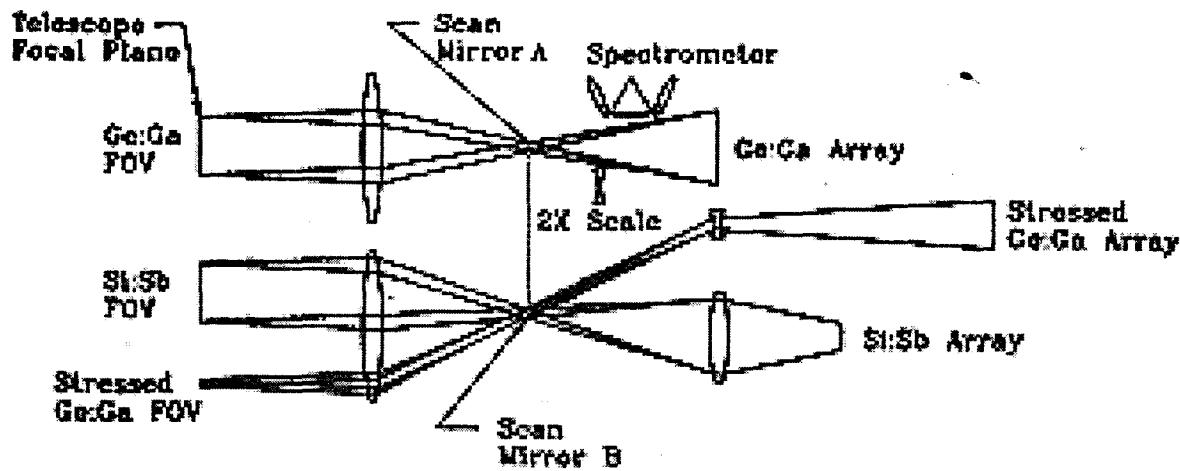
Fig. 5.— NGC3132 SED

Fig. 6.— NGC6781 DSS image.

Fig. 7.— NGC6781 SED

Fig. 8.— NGC68261 DSS image.

Fig. 9.— NGC6826 SED



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